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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Krisztian KISS et al.

Group Art Unit: 2146

Application No.: 10/733,635

Examiner: S. NOORISTANY

Filed: December 12, 2003

Attorney Dkt. No.: 059643.00280

For: REGISTRATIONS IN A COMMUNICATION SYSTEM

CLAIM FOR PRIORITY UNDER 35 USC § 119

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

October 31, 2007

Sir:

The benefit of the filing dates of the following prior foreign application filed in the following foreign country is hereby requested for the above-identified patent application and the priority provided in 35 U.S.C. §119 is hereby claimed:

Patent Application No. 0311006.1 filed on May 13, 2003 in Great Britain

In support of this claim, certified copy of said original foreign application is filed herewith.

It is requested that the file of this application be marked to indicate that the requirements of 35 U.S.C. §119 have been fulfilled and that the Patent and Trademark Office kindly acknowledge receipt of this document.

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Respectfully submitted,



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Enclosure: Priority Document (1)

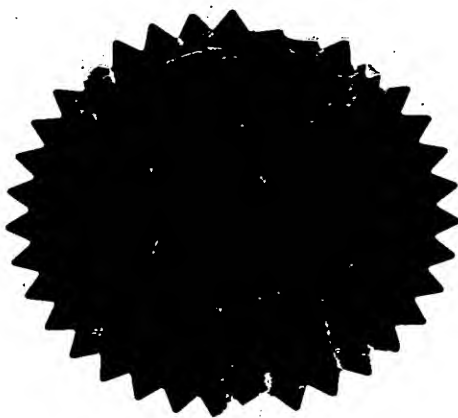
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3. Full name, address and postcode of the or of each applicant (underline all surnames)

NOKIA CORPORATION
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Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

FINLAND

7652217001

4. Title of the invention Registrations in a communication system

5. Name of your agent (if you have one)

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Description

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Claim(s)

3

Abstract

Drawing(s)

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Registrations in a communication system

Field of the Invention

- 5 The present invention relates to communication systems, and in particular to communication systems wherein a user may register an identity from multiple locations.

Background of the Invention

10

- A communication system can be seen as a facility that enables communication between two or more entities such as user equipment, communication network elements and other entities associated with the communication system. A communication system typically operates in accordance with a given standard or specification which sets out what the various entities associated with the communication system are permitted to do and how that should be achieved. For example, the standard or specification may define if the user, or more precisely, user equipment or terminal is provided with a circuit switched service and/or a packet switched service. Communication protocols and/or parameters which shall be used for the connection may also be defined. In other words, a specific set of "rules" on which the communication can be based on needs to be defined to enable communication by means of the system.
- 15
20
25

- Communication systems providing wireless communication for user equipment are known. An example of the wireless systems is the public land mobile network (PLMN). The PLMNs are typically based on cellular technology. In cellular systems, a base transceiver station (BTS) or similar access entity
- 30

serves mobile stations (MS) or other such wireless user equipment (UE) via a wireless interface between these entities. The communication between the user equipment and the elements of the communication network can be based on an appropriate communication protocol. The operation of the base station apparatus and other apparatus required for the communication can be controlled by one or several control entities. The various control entities may be interconnected. One or more gateway nodes may also be provided for connecting the cellular network to other networks. e.g. to a public switched telephone network (PSTN) and/or other communication networks such as an IP (Internet Protocol) and/or other packet switched networks.

15 An example of the services that may be offered for user such as the subscribers to a communication systems is the so called multimedia services. Some of the communication systems enabled to offer multimedia services are known as Internet Protocol (IP) Multimedia networks. IP Multimedia (IM) functionalities can be provided by means of a IP Multimedia Core Network (CN) subsystem, or briefly IP Multimedia subsystem (IMS). The IMS comprises various entities for the provision of the multimedia services.

25 The communication systems have developed in the direction wherein various service provision functions of the network are handled by network entities known as servers. For example, in the current third generation (3G) wireless multimedia network architectures it is assumed that several different servers are used for handling different functions. These include functions such as the call session control functions (CSCFs). The call session functions may be divided

into various categories such as a proxy call session control function (P-CSCF), interrogating call session control function (I-CSCF), and serving call session control function (S-CSCF). It shall be appreciated that the CSCFs may be also
5 referenced to as the call state control functions.

Communication systems may be arranged such that a user, typically a subscriber, has to initiate communications over the communication system. For example, a user may request for
10 a session, transaction or other type of communications from an appropriate communications network entity. Such communications can be seen as being originated from the user. From the above discussed network entities the serving call session control function (S-CSCF) forms the entity the user
15 needs to be registered at in order to be able to request for a service from the communication system.

In certain specifications, such as the 3GPP Release 6, which is currently the latest version of the 3GPP specifications,
20 the IMS networks are configured so as to allow the user to register a single public user identity from multiple locations using more than one contact addresses. The multiple contact addresses may even relate to different terminals having access to multiple access networks. For example, the
25 user may access the IMS via GPRS and/or WLAN networks with appropriate user equipment.

When proxying incoming requests, the network has the choice to route the request to all the registered contact addresses
30 or only some of them. In order to make the most appropriate routing decision, the network needs some sort of preference settings both from the user and the network on handling the

multiple contacts. More specifically, the network needs to decide whether it should fork a request or not. Subsequently, if forking is to be used, a decision is needed if sequential search or parallel forking is preferred. If sequential search
5 is preferred, then it needs to be decided in what order the different contact addresses associated with the registered user identity should be contacted.

Internet Engineering Task Force (IETF) document RFC 3261
10 "SIP: Session Initiation Protocol" by J. Rosenberg, et al., June 2002, describes the concept of sequential search. The RFC 3261 document is incorporated herein by reference. In the sequential search a sequential trial is performed with multiple contacts based on the user's preference given by the
15 so called q (preference) value. The q value is a parameter attached to the contact address, such as URI. If an attempt to contact the most preferred contact fails, then the next preferred is tried, until a final response is received from one of the contact addresses. The RFC 3261 also describes the
20 concept of parallel forking. In the parallel forking the different addresses are contacted simultaneously at the same time. That is, the network forks the incoming request to all of the registered contacts at the same time. Using the q values according to RFC 3261, the called party is able to
25 manipulate per registration basis the preferences on handling the registered multiple contacts.

A proposal is that the caller can also indicate her preferences on handling a certain request. The caller
30 preferences may overrule the called party preferences. This may be performed by using of a specific header field, i.e. the 'Request-Disposition' header field. The field specifies

caller preferences for how a server of the terminating network should process the request where this header field is included. This has been proposed to be performed by using the following directives. A fork-directive is propose to indicate
5 whether a proxy should fork a request ("fork"), or proxy to only a single address ("no-fork"). If the server is requested not to fork, the server should proxy the request to the "best" address. The best address would normally be the one with the highest q-value. In case the fork-directive is set
10 to "fork", then a parallel-directive indicates whether the caller would like the proxy server to proxy the request to all known addresses at once ("parallel"), or go through them sequentially, contacting the next address only after it has not received a final response for the previous one
15 ("sequential").

However, if neither the called party preferences nor caller preferences are defined, the network behaviour might be unambiguous. The terminating proxy server may require some
20 configuration how it should behave in this "default case".

Summary of the Invention

Embodiments of the present invention aim to address one or
25 several of the above problems.

According to one embodiment of the present invention, there is provided a method in a communication system for processing incoming requests at a controller entity, comprising:

30 registering a plurality of contact addresses for a user in the controller entity;

receiving a request at the controller entity for a communication link to the user;

enquiring a user information storage for information regarding the manner how to handle the request; and

5 processing the request in accordance with the information from the user information storage.

According to another embodiment of the present invention there is provided a communication system configured to
10 service a user with a plurality of contact addresses, the communication system comprising:

a multimedia network provided with a controller entity wherein the contact addresses of the user are registered; and

a user information storage configured to store
15 information regarding the manner how to handle request for the user, wherein the controller entity is configured to enquiry the user information storage and to process requests for connections to the user in accordance with the information from the user information storage.

20

According to yet another embodiment of the present invention there is provided a controller entity for a multimedia network, comprising a register for registering a plurality of contact addresses for a user and an interface to a user
25 information storage configured to store information regarding the manner how to handle request for the user, the controller entity being configured to enquiry the user information storage and to process requests for connections to the user in accordance with the information from the user information
30 storage.

The embodiments of the invention may provide various advantages. For example, the embodiments may allow the operator of the network to set the terminating proxy, i.e. terminating S-CSCF behaviour in case neither caller
5 preferences nor called party preferences are indicated. This allows, among other things, optimisation of the operation of the communication system.

Brief Description of Drawings

10 For better understanding of the present invention, reference will now be made by way of example to the accompanying drawings in which:

Figure 1 shows a communication system wherein the
15 present invention may be embodied; and

Figure 2 is a flowchart illustrating the operation of one embodiment of the present invention.

Description of Preferred Embodiments of the Invention

20 Reference is made to Figure 1 which shows an example of a network architecture wherein the present invention may be embodied. Figure 1 shows an IP Multimedia Network 10. IP multimedia services may be offered for IP Multimedia Network
25 subscribers. IP Multimedia (IM) functionalities can be provided by means of a Core Network (CN) subsystem comprising various entities for the provision of the service. The core network (CN) entities typically comprises various switching and other control entities and gateways for enabling the
30 communication via a number of radio access networks and also for interfacing the one communication system with other

communication system, such as with other cellular systems and/or fixed line communication systems.

In the shown arrangement a user equipment 1 may access the
5 IMS network 10 via two different access networks 2 and 4. The
exemplifying network comprise a General Packet Radio Service
(GPRS) network 2 and a Wireless local area network (WLAN) 4.
Each access network is provided with base stations 3 and 5,
respectively. The access networks are typically controlled by
10 at least one appropriate controllers (not shown for clarity).

A controller may be assigned for each base station or a
controller can control a plurality of base stations.
Solutions wherein controllers are provided both in individual
15 base stations and in the radio access network level for
controlling a plurality of base stations are also known. It
shall thus be appreciated that the name, location and number
of the network controllers depends on the system.

20 The base stations 2 and 5 are arranged to transmit signals to
and receive signals from the mobile user equipment 1 of a
mobile user i.e. subscriber via a wireless interface.
Correspondingly, the mobile user equipment 1 is able to
transmit signals to and receive signals from the base station
25 via the wireless interface. The mobile user may use any
appropriate mobile device adapted for Internet Protocol (IP)
communication to connect the network. For example, the mobile
user may access the cellular network by means of a Personal
computer (PC), Personal Data Assistant (PDA), mobile station
30 (MS) and so on. The following examples are described in the
context of mobile stations.

The skilled person is familiar with the features and operation of a typical mobile station. Thus these do not need any detailed explanation. It is sufficient to note that the user may use the mobile station 1 for tasks such as for
5 making and receiving phone calls, for receiving and sending data from and to the network and for experiencing e.g., multimedia content. The mobile station may comprise an antenna element for wirelessly receiving and transmitting signals from and to base stations of the mobile communication
10 network. The mobile station 1 may also be provided with a display for displaying images and other graphical information for the user of the mobile user equipment. Speaker means are also typically provided. The operation of the mobile user equipment may be controlled by means of an appropriate user
15 interface such as control buttons, voice commands and so on. Furthermore, a mobile user equipment is provided with a processor entity and a memory means. It shall be appreciated that although only one mobile station is shown in Figure 1 for clarity, a number of mobile stations may be in
20 simultaneous communication with each base station of the mobile communication system.

It shall be appreciated that the Figure 1 presentation is highly schematic and that in practical implementations the
25 number of base stations would be substantially higher, especially in network 2. One communication network may have a plurality of radio access networks.

In the current third generation (3G) wireless IP multimedia
30 network architectures it is assumed that several different server entities are used for handling different functions. These include entities that handle call session control

functions (CSCFs). The call session functions may be divided into various categories such as a proxy call session control function (P-CSCF), interrogating call session control function (I-CSCF), and serving call session control function (S-CSCF). For clarity, Figure 1 shows only the S-CSCF 12.

The serving call session control function 12 forms an entity whereto the subscriber 10 shall be registered at. The registration is required in order to be able to request for a service from the communication system. A user may register himself via any appropriate access system, such as the shown networks 2 and 4.

In Figure 1 the user 1 is shown to have a plurality of contacts 7 registered at the controller entity 12. More particularly, contact addresses 'contact 1 (q1)' to 'contact x (qx)' are provided via the GPRS network 2. Contact addresses 'contact 2 (q2)' to 'contact y (qy)' are provided via the WLAN network 4. All these contact are registered at the contact register 14 of the controller entity 12.

A subscriber information storage is shown to be provided by a home subscriber server (HSS) 20. The home subscriber server (HSS) 20 is for storing subscriber i.e. user related information. The home subscriber server (HSS) can be queried by other function entities over the appropriate interfaces, e.g. during session set-up procedures. The subscriber information conventionally includes information such as authentication data (e.g. registration identities of the subscriber or the terminals) and so on. The HSS can also be used for storing permanently subscriber profile information.

The preferred embodiment relates to call set-up procedures when user 6 tries to make a call to the mobile user 1 who has multiple registrations at the serving call state control function 12. It may occur that the called user 2 has not indicated to the S-CSCF 12 any preferences for forking of incoming requests via its registration, for example by using the 'q' values. The calling user 6 has not indicated any preferences either, for example by using the above discussed 'Request-Disposition' header field.

To avoid an undefined situation, the user profile 22 stored in the subscriber information storage 20 contains information how the incoming requests shall be handled. The implementation of the use of this information may be similar to the fork-directive and the parallel-directive as described above. The operator of the HSS 20 is preferably able to provision the information stored in the HSS. The operator is also preferably able to modify statically the stored information.

In the operation, an incoming request arrives at step 30 to the S-CSCF 12 to be terminated for the mobile user 1. The user 1 has not indicated any q values via registration to the S-CSCF 12. Neither does the incoming request have any preferences of the caller, for example by means of the 'Request-Disposition' header field. In such situation the S-CSCF 12 routes the request at step in accordance with the user profile 22 stored in the HSS 20.

For example, the user profile 22 may be configured to indicate the following alternatives: proxy to only a single contact (no forking), proxy the request to all known

addresses at once (parallel forking), or proxy the request sequentially. In the last case the order may be randomly chosen (sequential search). In certain applications two options might be enough. For example, the options could be no
5 forking and sequential forking. More than three options may also be used.

The processing may occur in accordance with the information from the user information storage only if no user preference
10 has been indicated for the known contact addresses. For example, any preference indicated by the request may overrun the information from the user information storage. Alternatively, the user information may not even be enquired if the request includes a preference, or if the preference is
15 otherwise known.

The enquiry may only be applied to a sub-group of the known contact addresses. For example, the sub-group may consist of the WLAN or GPRS addresses in Figure 1.

20 Handling instructions may be indicated and assigned for each contact address independently during their registration at the controller entity 12. The handling instructions may be indicated and assigned for each contact address by the user
25 equipment 1 or the user information storage.

It should be appreciated that whilst embodiments of the present invention have been described in relation to mobile stations, embodiments of the present invention are applicable
30 to any other suitable type of user equipment.

The embodiment of the present invention has been described in the context of an IMS system and GPRS and WLAN networks. This invention is also applicable to any other access techniques including code division multiple access, frequency division multiple access or time division multiple access as well as any hybrids thereof. Furthermore, the given examples are described in the context of the so called all SIP networks with all SIP entities. This invention is also applicable to any other appropriate communication systems, either wireless or fixed line systems and standards and protocols. Examples of other possible communication systems enabling wireless data communication services, without limiting to these, include third generation mobile communication system such as the Universal Mobile Telecommunication System (UMTS), i-phone or CDMA2000 and the Terrestrial Trunked Radio (TETRA) system, the Enhanced Data rate for GSM Evolution (EDGE) mobile data network. Examples of fixed line systems include the diverse broadband techniques providing Internet access for users in different locations, such as at home and offices. Regardless the standards and protocols used for the communication network, the invention can be applied in all communication networks wherein registration in a network entity is required.

25 The embodiment of the invention has discussed in the context of a servicing call state control function. Embodiments of the present invention can be applicable to other network elements where applicable.

30 In addition or as an alternative to the home subscriber server (HSS) 20 described above, the required user

information may be obtained from any appropriate database configured to store user specific information.

It shall also be appreciated that in addition to the serving control entity 12, the user may need to be associated with a proxy control entity. The proxy entity may be assigned to an area within which the user has roamed. Thus, when a user accesses the network through an arbitrary type of access network the access network may assign a proxy control entity for controlling the accessed services from that network point of view, e.g. for bandwidth management. It is also possible that the user may search and find an appropriate P-CSCF with his user equipment without help from the access network. The other possible call state control function entities are omitted from Figure 1 for clarity.

It is also noted herein that while the above describes exemplifying embodiments of the invention, there are several variations and modifications which may be made to the disclosed solution without departing from the scope of the present invention as defined in the appended claims.

Claims

1. A method in a communication system for processing incoming requests at a controller entity, comprising:
 - 5 registering a plurality of contact addresses for a user in the controller entity;
 - receiving a request at the controller entity for a communication link to the user;
 - enquiring a user information storage for information
 - 10 regarding the manner how to handle the request; and
 - processing the request in accordance with the information from the user information storage.
2. A method as claimed in claim 1, wherein a user profile
- 15 stored in the storage includes at least two predefined options how to handle requests for the user.
3. A method as claimed in claim 2, wherein the options are:
 - proxy to only a single contact address, proxy the request to
 - 20 all known contact addresses at once, or proxy the request sequentially to the known contact addresses.
4. A method as claimed in any preceding claim, wherein the controller entity is provided in association with a
- 25 multimedia network.
5. A method as claimed in any preceding claim, wherein the user registers contact addresses in at least two different communication networks.
- 30 6. A method as claimed in any preceding claims, wherein the processing occurs in accordance with the information from the

user information storage only if no user preference has been indicated for the known contact addresses.

7. A method as claimed in any of the in any preceding
5 claims, wherein the enquiry is applied to a sub-group of the known contact addresses.

8. A method as claimed in any of the preceding claims,
wherein handling instructions are indicated and assigned for
10 each contact address independently during their registration.

9. A method as claimed in claim 8, wherein the handling
instructions are indicated and assigned for each contact
address by either the user or the user information storage.

15

10. A communication system configured to service a user with
a plurality of contact addresses, the communication system
comprising:

a multimedia network provided with a controller entity
20 wherein the contact addresses of the user are registered; and
a user information storage configured to store
information regarding the manner how to handle request for
the user, wherein the controller entity is configured to
enquiry the user information storage and to process requests
25 for connections to the user in accordance with the
information from the user information storage.

11. A controller entity for a multimedia network, comprising
a register for registering a plurality of contact addresses
30 for a user and an interface to a user information storage
configured to store information regarding the manner how to
handle request for the user, the controller entity being

configured to enquiry the user information storage and to process requests for connections to the user in accordance with the information from the user information storage.

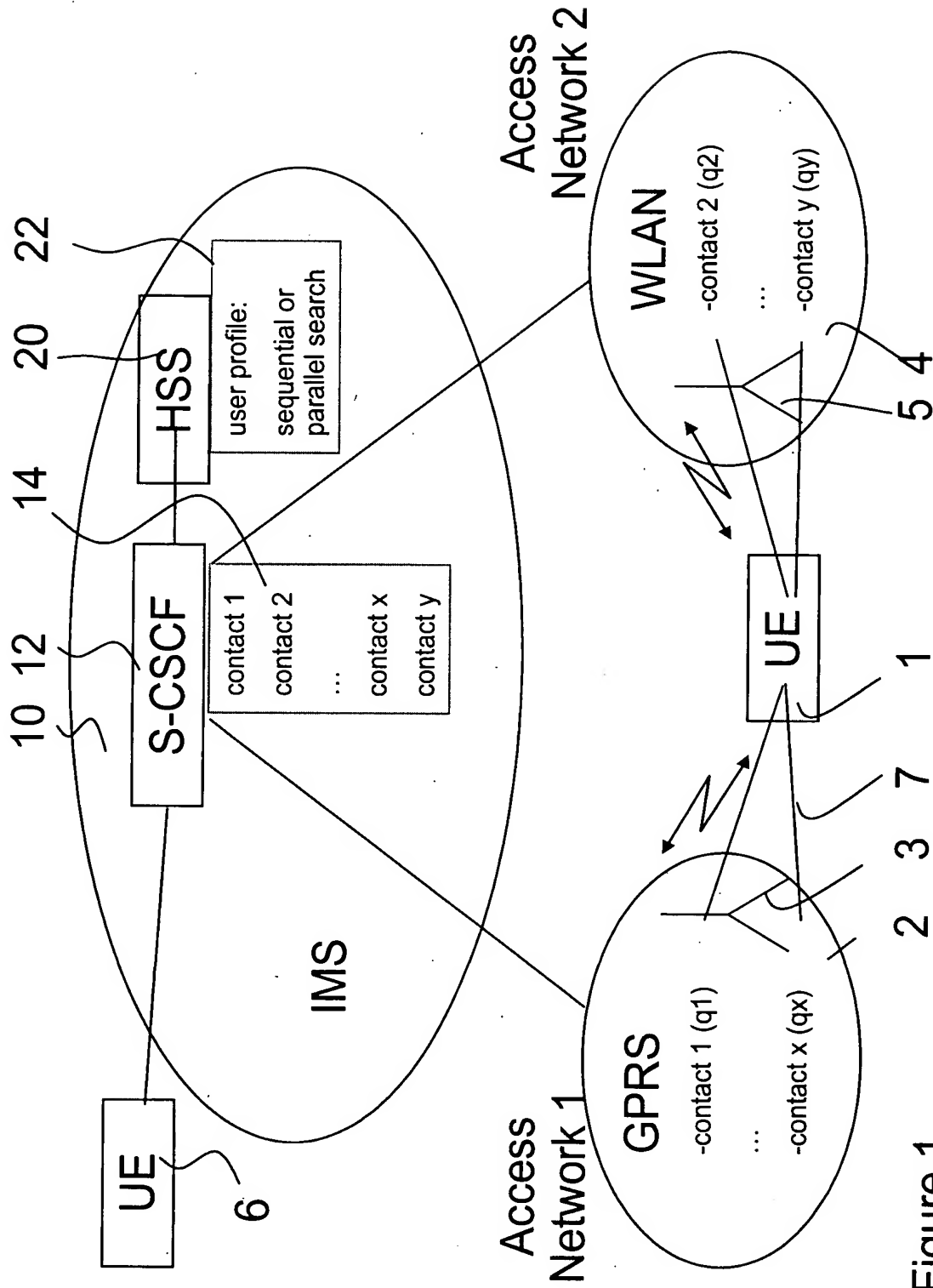


Figure 1

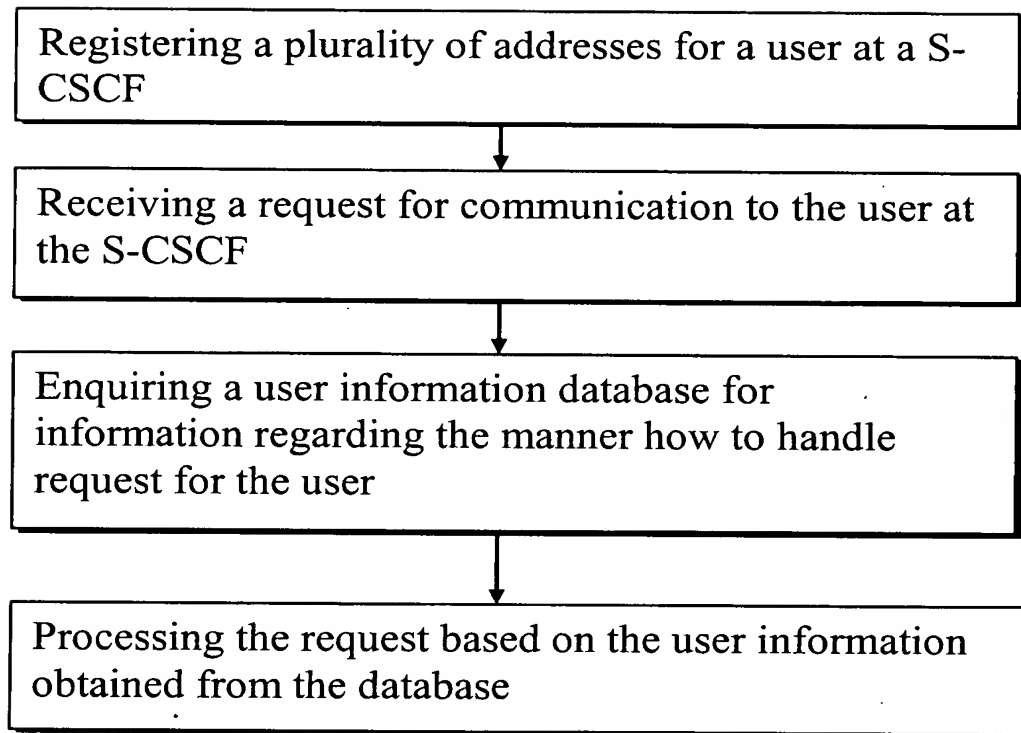


Fig. 2